Rewriting & Music

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(click on a part to jump to its first slide)

Part 0

Music Information:
Representation levels
& examples of creations

Information Theoretical   *Data Rate*

<genre> Romantic </genre>
 <form> Sonata </form>

Grazioso

Allegro assai
Violon

$p < >$ p

Semantic   < 0.1 Hz
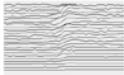
Symbolic   0.1-25 Hz

Control   10Hz-1kHz

Signal   10-100 kHz

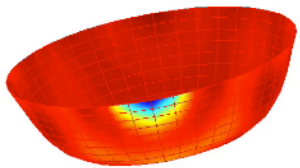*p(x,y,z,t)*   Physical   10-100 kHz

Low information quantity
Implicit knowledge

Information
generation:
Synthesis

Information
reduction:
Analysis

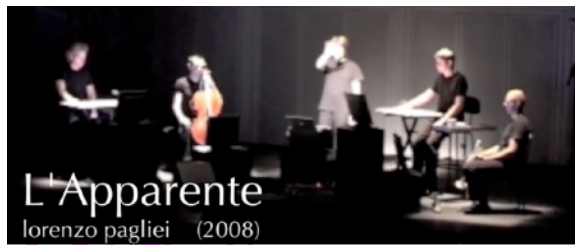High information quantity
Explicit representations

source: Hugues Vinet & Arshia Cont

Sound synthesis by physical modeling

Lorenzo Pagliei, *Apparente* for cello, trumpet
mime percussionist and gesturally controlled Modalys (2008)

source:
Arshia Cont

Voice transformations and synthesis
Concatenative synthesis with cataRT. Scoring artificial voices
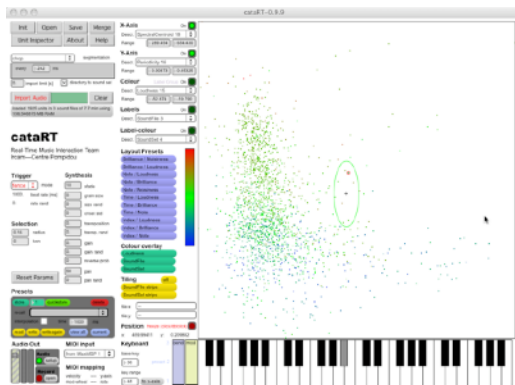
George Aperghis, *Luna Park* (2011)
Computer music design: Gregory Beller

Excerpt of artificial voice synthesis
consonnance-only synthesis

SuperVP and VoiceForger realtime technologies

Michael Levinas, *La Métamorphose* (2012)
Computer music design: Benoît Meudic

Excerpt of artificial voice multiplication
using one soprano as input

Thierry De Mey, *SIMPLEXITY la beauté du geste* (2016)

gesture captation (sensors, wrist devices)
triggers musical sequences / synthesis
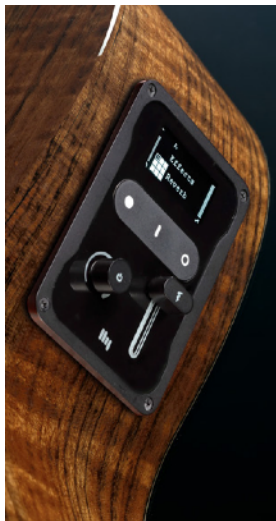
acoustics of music instruments
smart instruments

hybridation of guitar vibrations with:
- sensor (piezo) below strings
- actuators on the top plate of the guitar

creates effect without speakers

real-time processing embedded on a Beagleboard

IMuSE : Integrated Multimodal Score
following Environment (Keith Hamel)
for interactive music performances

track performance with
gesture follower (gf & imubu) and audio
follower (antescofo~)
synchronize to score with NoteAbilityPro

Metronaut
automatic accompaniment
anticipatory score follower
antescofo.com

Ada Lovelace (1815-1852)
first programmer in history
worked on Charles Babbage's Analytical Engine

« Supposing, for instance, that the fundamental relations of pitched sounds in the science of harmony and of musical composition were susceptible of such expression and adaptations, the engine might compose elaborate and scientific pieces of music of any degree of complexity or extent. »
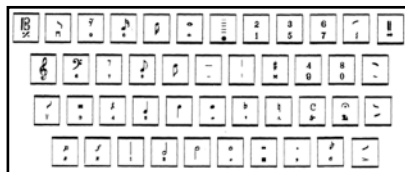
Ada Lovelace. *Sketch of the Analytical Engine Invented by Charles Babbage.* in Scientific Memoirs, Vol 3 (1842)

Lejaren Hillet (1924-1994)
Illiac Suite for string quartet (1957)
First computer written music piece, at U. of Illinois at Urbana
rule based approach to stochastic processes.

- Iannis Xenakis (1922-2001)
  Architect, Engineer, Composer
  Stochastique Music: processus global prévisible aux composants aléatoires.
  Diamosphoses (1957), Première pièce électronique stochastique à l'aide d'un ordinateur IBM.

- Pierre Barbaud (1911-1990)
  Algorithmic Music

- Birth of "*Computer Assisted Composition*" (CAC)
 Computing the time and the event

http://www.iannis-xenakis.org/fxe/ecrits/mus_form.html
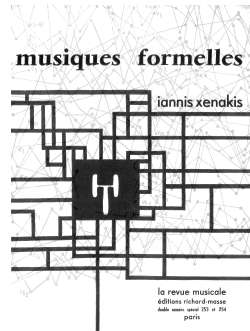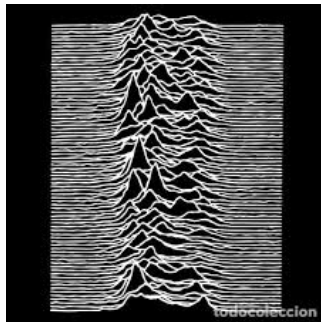
IanniX open source graphical sequencer

Thierry Coduys, Guillaume Jacquemin (CEMAMu)
https://www.iannix.org

Open Music Graphical Programming Environment
Carlos Agon, Gérard Assayag, Jean Bresson (Ircam)
http://repmus.ircam.fr/openmusic/home

- algorithmic composition
- authoring time and interaction
- sound spatialisation
- sound transformation
- sound synthesis
- …
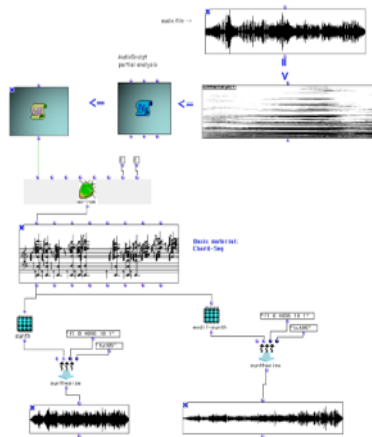
Information Extraction from musical contents : audio (signal) or symbolic

information: high-level   semantics, metadata
          medium-level symbolic (pitch, onset), music notation
          low-level   signal (spectrum)

MIREX tasks:
- search
- document retrieval
- document classification, genre/artist detection
- similarity measurement, plagiarism detection
- music recommendation
- segmentation, inference of structure
- detection of repetitions (self similarity)
- instrument estimation
- key estimation
- chord tracking
- beat / tempo inference
- meter estimation
- version identification
- score alignment (offline) DTW
- score following (RT, online) anticipation
- analysis (musicology): recognition motives, form, cadences

audio MIR:
automatic methods for organizing and browsing large audio collections (audio streaming industry)

symbolic representations:
- search & retrieval in music score databases
- digital musicology knowledge extraction